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# DESIGN AND DEVELOPMENT OF A COLLEGE KNOWLEDGE MANAGEMENT SYSTEM

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## ABSTRACT

Knowledge Management Systems refer to any kind of IT system that stores and retrieves knowledge, improves collaboration, locates knowledge sources, mines repositories for hidden knowledge, captures and uses knowledge, or in some other way enhances the KM process.

The diffusion of computers, Wi-Fi and Internet connectivity in some colleges, and the increase in the usage of mobile smart phones and social media by college administrators, lecturers and learners, is an option for technologies and information systems for Knowledge Management to be implemented in colleges. The implementation of such will benefit colleges in the following ways; improved organizational agility; better and faster decision making; quicker problem-solving; increased rate of innovation; supported employee growth and development; sharing of specialist expertise; better communication; improved business processes.

Colleges in the nation requires a Knowledge Management System (KMS) though most systems in the education sector have Education Information Management System (EIMS) and College Information Management Systems (CIMS). The role of Knowledge Management is to assure competitiveness, through capturing, storing, sharing, and utilizing knowledge in an innovative way in order to improve performance of an organisations. Colleges as organisations, requires a knowledge base to manage knowledge electronically. In Zambia, little efforts in Knowledge Management System development have been undertaken that shed light on this topic. The purpose of this project is to develop an online College Knowledge Management System for use by various stakeholders in Zambian Colleges.

The system will consist of three (3) major components: 1) people, who keep the knowledge and apply them; 2) processes, with which people create, capture, store, organize, and distribute knowledge; and 3) information, which are the pieces of facts and data that people convert into and apply as knowledge and shall be development based on one of the Nine ICT KM methods and tools model, the current and available online system creating tools and infrastructure for content management system to design and implement an online knowledge base for college knowledge management.

The system software development is based on Rapid Application Development (RAD) method.

The project is intended to contribute to the technologies and information systems resources for Knowledge Management initiatives and practice in Zambian Colleges.

**Keywords**: College, Knowledge Base, Knowledge Management, HTML and Online System.

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## CHAPTER ONE

## INTRODUCTION TO THE RESEARCH

### A. *1.1 Introduction*

A Knowledge Management System (KMS) is a system for applying and using Knowledge Management principles. These include data-driven objectives around business productivity, a competitive business model, business intelligence analysis and more. Knowledge sharing can be facilitated through Information and Communications Technologies that include, smart phones, computers, search engines, emails, Video-conferencing, Skype, social media apps, information systems, office productivity tools and many more. However, appropriate tools to store, access, distribute and to use knowledge resources in Colleges are still in their infancy and in most cases non-existence. ICTs have a prominent role on KM initiatives and the value of KM is more when made available to the right people at the right time. Colleges, like most organizations, should learn and gain knowledge in order to improve decision making and innovation especially in the age of increased external and internal pressures for change and improvement. The government encourages the use the technology and demands lecturers to have a professional responsibility to ensure that own their skills and knowledge are regularly updated (TCIG 2017),

There are two basic approaches to KM for which technologies can provide support: codification and personalization according to Hansen et al, (Bernard C.Y. T n.d). With the codification approach, more explicit and structured knowledge is codified and stored in knowledge bases. The main role of Information Technologies is to help people share knowledge through common storage to achieve economic reuse of knowledge. An example of such IT tools is electronic knowledge repositories. With the personalization approach, more tacit and unstructured knowledge is shared largely through direct personal communication. The main role of IT here is to help people locate each other and communicate so as to achieve complex knowledge transfer.

APO's Nine ICT KM methods and tools model (APO 2010), will be used in this project development. The system is intended to provide a dynamic online Knowledge Base System for secondary Colleges system as a resource for Knowledge Management initiatives and practice in a Colleges set up in Zambia.

### B. *1.2 Motivation and Significance of the Study*

I am motivated to develop a system that can contribute and to improve on the already existing efforts in secondary Colleges by the following factors;

1. Access to knowledge resources on a single system by College learners.
2. Saving money from hardcopy repositories in secondary Colleges.
3. Accessing knowledge base anytime and anywhere, saving time and energy of reach knowledge resources from the teaching staff and Colleges who have limited working hours.
4. Lack of spaces and staff in Colleges to manage knowledge resources mainly due to over enrolment of students to handle and understaffing of lecturers.
5. Expenses in managing knowledge on paper and external electronic media such as CDs in Colleges.

Lack of an existing online knowledge base system in Zambia for secondary level of education knowledge management.

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### C. 1.3 Scope

The research was done in Lusaka at the Zambia Institute of Mass Communications Educational Trust, A quasi government learning institution providing media training.

The proposed system is intended to handle knowledge online in soft copies, very easy to search, be accessed anytime, anywhere, free and affordable.

It is intended to include ICTs and KM integration in Colleges. Although KM technologies are in practice in all sectors, the integration of KM and education administration is a very new phenomenon in Zambia. KM with ICTs in Colleges needs knowledge and suggestions from lecturers who are experts in pedagogy. The project development takes ICT as simply technologies and the ICT environment to include infrastructure available in College, competency of lecturers with technology and the available knowledge of technology-based KM initiatives.

### D. 1.4 Problem Statement

Currently knowledge is managed in hardcopy files, takes up more space in filling cabinets as well as takes more time to be accessed by intended users and it very much less secure. In Colleges, there is evidence of some KM initiatives that involve sharing, transfer, and creation and storage of Knowledge. Mostly, lesson study in Colleges is practiced as a Non-ICT KM approach, a part of College Program of In-service for the Term (SPRINT). In these program successful lecturers share excellent subject knowledge and great skills in planning, preparing and providing effective learning experiences (TCIG, 2013).

I claim that ICTs such as social media (Facebook, WhatsApp, and Twitter etc.), emails, wikis, and some Open source Information systems can be used to engage lecturers in professional learning and to spice the already existing efforts in KM initiatives in Colleges.

### E. 1.5 Aim

The aim of this project is to develop a knowledge Management system for use in Zambian colleges which fulfils the following requirements;

### F. 1.6 Objectives

The main objective of this study was to design and develop an online knowledge Management system for colleges in Zambia to eliminate the current prevailing manual mechanisms.

### G. Specific Objectives

1. To Allow users to search and store knowledge and maintain knowledge that is based on the on-KM community of practice for Colleges.
2. To Provide a record of information in archives and feedback for users to share.
3. To allow users to enrol for courses
4. Lecturers forum to monitor knowledge on the system
5. To allow users to log in and out
6. To Store knowledge in categories in the system database
7. To Maintain and handle users frequently asked questions.
8. Administration to assign roles
9. To develop system secured from human and virus attacks.

### H. 1.7 Research Questions

RQ1: What limitations are faced when accessing and retrieving knowledge?

RQ2: How is manually stored information protected and secured?

RQ3: What impact do you expect on the use of technology to manage data?

RQ4: What challenges are faced when knowledge is not available in real time?

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### I. 1.8 Organisation of the thesis

The research report consists of five chapters. The first chapter focuses on introductory aspects includes background of the study statement of the problem, objective of the study, scope of the study, significance and limitations of the study & definition of terms. Chapter two present the literature review, which served as a basis for understanding the subject matter. The third chapter contains the methodology and data collection tools suitable for the development of this system and its derivation. In chapter four the results of the system are tested based on user's experience. Lastly, the discussion of the results is to be found in chapter five with a consequential conclusion.

### J. 1.9 Summary

In the introduction, the author has detailed the background of the problem that lead to the research on the subject matter be conducted. Several challenges faced by colleges in Management of knowledge have been identified and discussed. The development of the system at hand is to provide a solution to the current prevailing problems.

## CHAPTER TWO

## LITERATURE REVIEW

### K. 2.1 Introduction

Information practices and learning strategies known as knowledge management are gaining acceptance in the field of education. At the most basic level, knowledge management can be described as a set of practices that helps to improve the use and sharing of data and information in decision-making.

In this chapter, the Knowledge and Knowledge Management in education setup shall be discussed. The knowledge and knowledge Management in ICT colleges and various institutions will also be a subject of discussion under this chapter as well as the technology-based knowledge Management, the lecturers and technology-based knowledge Management with the benefits of technology-based KM in colleges starting with the global, region and national perspectives.

### L. 2.2 Review of the Literature

#### 1) 2.2.1 Knowledge and KM in Education

According to Cong and Pandya, Knowledge Management is "An ability of an organization to use its collective knowledge through a process of knowledge generation, sharing and exploitation enabled by technology to achieve its objectives" (Kurniawan, Y 2014). However, knowledge management can be classified as support for teaching and non-teaching staff. Knowledge based technologies, can be used in Colleges, in facilitating the knowledge management within the College for academic services. Knowledge has been defined as, an individual or group capacity developed through formal learning and experience to evaluate and translate data related to the stated problem or objective(s) pursued into meaningful information which enables an effective action, according to Biloslavo R, Zornadab M. The effective deployment of ICTs can lead to improved agricultural competitiveness through cuts in production and transaction costs, that raises production efficiencies and farm incomes, conserving natural resources, and by providing more information, choice and value to stakeholders. ICTs have changed the outlook of agriculture in many third world countries. In these countries, most agricultural activities, are now established on the use of web-linked interactive databases that provide information on weather, natural resources, credit, quantities of products demanded and government programmes, as well as technical knowledge

Information practices and learning strategies known as knowledge management are gaining acceptance in the field of education. At the most basic level, knowledge management can be described as a set of practices that helps to improve the use and sharing

of data and information in decision-making. Knowledge needs to be managed in knowledge management. Knowledge can be divided into explicit and tacit knowledge according to Ali et al (n.d), tacit knowledge is know-how, skills and experience embedded in the minds of individuals, and it is difficult to put into words, thus making it difficult to communicate or share with others. Tacit knowledge can only be transmitted through direct interaction between transmitters and receivers of knowledge, for example, through training, meeting or personal experience. Knowledge and expertise of lecturers and students learning are examples of tacit knowledge. Since tacit knowledge has high value, Nonaka and Takeuchi (Ali et al n.d), believe that for an organization to leverage its knowledge, tacit knowledge should become explicit. Thus, the goal of knowledge management is to convert tacit knowledge to explicit knowledge. Knowledge based technologies, can be used in Colleges, in facilitating the knowledge management within the College for academic services. Knowledge has been defined as, an individual or group capacity developed through formal learning and experience to evaluate and translate data related to the stated problem or objective(s) pursued into meaningful information which enables an effective action, according to Biloslavo R, Zornadab M. The effective deployment of ICTs can lead to improved agricultural competitiveness through cuts in production and transaction costs, that raises production efficiencies and farm in-comes, conserving natural resources, and by providing more information, choice and value to stakeholders. ICTs have changed the outlook of agriculture in many third world countries. In these countries, most agricultural activities, are now established on the use of web-linked interactive databases that provide information on weather, natural resources, credit, quantities of products demanded and government programmes, as well as technical knowledge.

Information practices and learning strategies known as knowledge management are gaining acceptance in the field of education. One cornerstone of data design and data normalization is that data organization for storage differs from the information most people want to see. Example: a manager of a sporting goods supply company might want to see for one scale who the customer was, the destination of the order, the billing address, the contact phone number, the placement time of the order, the order's shipping destination when and how delivery occurred, what article the order included and which of the company's database differs from the particular information the manager wants. However, as you can imagine the hierarchical database model has some serious problem for one, you cannot add record to a child table until it has already been incorporated into the parent table. This might be troublesome if, for example you wanted to add a student to who had not yet signed up for any course. Yet the hierarchical database model still creates repetition of data within the database. You might imagine that in the database system shown above, there may be a higher level that includes multiple courses. In this case, there could be redundancy because students would be enrolled in several courses and thus each "courses tree" would have redundant student information. 12 Redundancy would occur because hierarchical database handles one to many relationships well but do not handle many relationships well. This is because a child may only have one parent. However, in many cases, you will want to have the child to be related to more than one parent for instance the relationship between student and class is a "many-to-many" not only can a student take many subjects but many students may also take a subject. How would you make this relationship simple and efficiently using a hierarchical database? The answer is that you wouldn't. Though, this problem can be solved with multiple databases creating logical links between children. The fix is very clogged and awkward faced with these serious problems. The network model was conceived in many ways "the network

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database model was designed to solve some of the serious problems with the hierarchical database model. Specifically, the network model solves the problem of data redundancy by representing relationships in terms of sets rather than hierarchy. The network model uses set theory to provide a tree, like hierarchy with the exception that child table were allowed to have more than one parent. This allows the network model to support many-to-many relationships. Visually, a network database model looks like a hierarchy database is that you can see a type of tree. However, in the case of a network database look is several trees which share branches. At the core of the relational model is the concept of a table (also called a relation) in which all data is stored.

Each table is made up of records (horizontal rows also known as tuples) and field (vertical columns also known as attributes). It is important to note that how or where the table of data are stored make no different, each table can be identified by a unique name and that name can be used by the database to find the table behind the scene. This is quite a bite different from the hierarchical and network models in which the user had to understand how the data were structured within the database in order to retrieve, insert, update or delete records from the database. So how does one find data in a relational database if there is no map to follow?

Well in the relational model, operations that manipulate data do so on the basis of the data values themselves, thus if one which to retrieve a row from a table for example, one could do so by comparing the values stored within a particular column for that row to some search criteria for example, “give me all the rows from the “Books’ table which have “Project” in the “First Name” column the database might return list which looks exactly like this. This data access methodology makes the relational model, a lot different from and better than the earlier database model because it is a much simple model to understand. This is probably the remaining season for the population of relational database systems today. Another benefit of the relational system is that, it provides extremely useful tools for database administration.

Practically, a table cannot only store actual data but they can also be used as the table means for generating meta-data (data about the table and field names which form the database structure, access rights to be database, integrity and data validation rules. According to Navethe S. (2006) “Fundamental at Database system” says that everything within the model can be stored in tables this means that to provide information about the data. In other words, a user can query information concerning table, names, access right or some data and the results of these queries would then be presented to the user in the form of a table. There are many types of database and all of them will be useful for web applications. It will be the client/server database rather than the stand-alone packages that will be adopted for the web. A client server database works like this: a database server is left running 24 hours every day. Thus, the server can handle database request at any hour. Database request come in form of “clients” who access the database through its command line interface or by connecting to a database socket. Requests are handled as they come in and multiple requests can be handling at one time. For network application that must be available for worldwide time zone usage, it is essential to build upon a client-server database, which can run all the time. Ugorji (2009) defined relation as a set of tuples and that by definition, all the elements of a set distinct: hence all tuples in a relation must also be distinct. This means that no two tuples have the same combination of values for all values for all their attributes. Any set of attributes of a relation schema is called a “Super key” relation has at least one super key: the set of all its attributes. A key is a minimal super key i.e. a super key from which we cannot remove any attribute and still have the uniqueness constraints hold.

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In general, a relation schema may have more than one key. In this case, each of the keys is called a candidate key as the primary key of the relation. A foreign key is a key in a relation R but it is not a key, rather just an attribute in other relation R' of the same schema simple put its primary key in order table. As quoted from Codd's definition of entity integrity (2005) "No component of primary key is allowed to have a missing value of any type". The notation of entity arises from the choice of a primary key while reverential integrity arises from the choice of foreign keys. In a relational database, a primary key is a set of attributes designed by the user, is satisfied in a relation, if each tuple in the relation is uniquely identified by the primary key values. In addition, the primary key must be minimal set of attributes for which this uniqueness properly holds. This is because the primary key value is used to identify individual tuple in a relation, having null values for the primary implies that some tuples cannot be identified. This referential integrity constrains is used to maintain the consistency among tuples of relations. Informally, the referential integrity constrains states that a tuple in one relation that refer to another relation must refer to an existing tuple in that relation on the other hand a prime attribute of a relation R is an attribute of a relation schema R, if it is a member of key in the relation R. Consequently, a non-prime is an attribute if it is not a member of any candidate key. In addition, a functional dependency denoted by X, Y between two set of attribute X and Y that are subset of R specifies a constraint on the possible tuple that can form a relation instance of R.

**Table 1**: **Relational Database Model**

| | | | |
|---|---|---|---|
| Project Management Theory | John Peter | JNC-243 | 1809-1985 |
| Project Management Practice | Luke Johns | JNC-124 | 3010-2013 |
| Project Evaluation and Monitoring | Paul Saul | JNC-360 | 0410-2017 |
| Project implementation | Ken Woods | JNC-365 | 1102-2012 |

**Database Normalization**

According to Elmasri and Navatue (2004), the normalization process as first proposed by Codd (1972) takes a relative schema through serial tests to certify whether to belong in a certain form (NF). Initially, Codd proposed three normal forms which he called 1st, 2nd, and 3rd normal form. The definition of the 3NF was proposed later by Boyce and Codd and is known as Boyce Codd normal form (BCNF). All these normal forms are based on the functional dependencies among the attributes of a relation. Later, a forum normal form (4NF) and the fifth normal form (5NF) was proposed, based on the concept or multi-valued dependencies and join dependencies respectively. Normalization of data can be looked on as a process of organizing data in a database or processes during which unsatisfactory relation schema are decomposed by breaking their attributes into smaller relation scheme that process desirable properties. One objective of the normalization process is to improve flexibility and to ensure that redundancy and inconsistent dependency anomalies do not occur.

Normal forms provide database design with: (a) A formal framework for analyzing relation schema as based on their keys and on the functional dependencies among their attributes. (b) A series of fast that can be carried out on individual relation schema. So that the relational database can be normalized to any degree. When a test fails, the relation that individual meets the normalization test as outlined below: FIRST NORMAL FORM which is a relation is in first normal form (INF) if and only if all underlying simply domains contain atomic values only. Atomic data is a form of nominalism for data item. A data item is atomic if only one item is in each cell of a table. Thus, INF tends to

i. Eliminate repeating groups in individual tables.
ii. Create a separate table for each set of related data.
iii. Identify each setoff relation data with a primary key. SECOND NORMAL FORM A relation is

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in second normal form (2NF) if and only if it is in INF and every one-key attribute its fully dependent on the primary key. Where the INF deals with redundancy of data across a horizontal row.

2NF deals with redundancy of data in vertical columns. Thus, 2NF tends to:

i. Create separate table for set values that apply to multiply records.
ii. Relate these table with a foreign key 18

Third Normal Form A relation in third normal form (3NF) if and only if it is 2NF and every non-key attribute is non transitively dependent on the primary key. Eliminate fields that do not depend on the key. Codd Boyce Normal Form A relation is in Boyce-codded normal form (BCNF) if and only if determinate is a candidate key. A determinate is any attribute on which some attribute is (full) functional dependent. Fourth Normal Form A relation is in fourth normal form (4NF) if and only if whenever there exist multiple dependencies in the relation. Thus, this form prohibits independent multi value components of the key, for example, if an employee can have many skills and many dependents, you would move the skills and dependents to separate tables, as they are not related in any way.

Fifth Normal Form A relation R is in fifth Normal Form (5NF) or protection Join Normal Form (PJNF) if and only if every join dependency in R is a consequence of the candidate keys of it basically, it advocates that you continue splitting the structure down until either two states exists that you've split so far that the resulting tables could not be joined to reconstruct the original further splitting would re retrieval.

Domain Key Normal Forms This defines sticker forms that consider additional types of dependencies and constrains. The idea behind Domain Key Normal Form (DKNF) is to specify (theoretically at least). The "ultimate Normal Form" that considers a constraints and dependencies that should hold on the relation can be enforced simply by enforcing the domain constraints and key constraints specified on the relation. Furthermore, normal forms when considered in isolation from other factors, do not guarantee a good database design. It is generally not enough to check separately that each relation schema 1, the database is in BCNFO. 3NF, rather, the process of normalization through 19 decomposition must also confirm the existence of additional properties that the relational schema, taken together should possess two of these properties

1. The loss/less join or non-Additive joints property which guarantees that the super key tuple problems do not occur.
2. The dependency preservation property which ensures that all functional dependency is represented in some of this individual resulting database It is however important to point out here that those normal forms; BCNF, 4NF, 5NF and DKNF do exit but are rarely considered.

In practical design, disregarding these rules may result in their perfect database designed but should not affect functionally as originally intended. Open Source Model This is a generalized concept for tree software development and acquisition. It is often confusing to people to learn that an open source company may give its products away for free or a minimal cost. How then do "Open source" companies make up for the cost while it is true that an open source business may not make money directly from products, it is untrue that open source business may not make money directly from its products, it is untrue that open source companies do not generate stable and scalable revenue streams. In the 21st century web technology market, it is open source company that has the greater long strategic advantage company such as LINUX, APACHE, MYSQL, and NETSCAPE, host of web specific technology companies such as mail have demonstrated this.

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At the most basic level, knowledge management can be described as a set of practices that helps to improve the use and sharing of data and information in decision-making. Knowledge needs to be managed in knowledge management. Explicit knowledge is tacit knowledge that is formalized, well-documented, archived, codified and easily accessed by others. It is a 'know what' knowledge that is objective in nature.

*2) 2.2.2 KM and ICT in Colleges*

Since the main asset of institutions is knowledge of individuals, knowledge management activities should be formally recognized as a new paradigm that can contribute to knowledge creation. The role of information communication technology (ICT) in knowledge management is an essential consideration for educational institutions wishing to exploit information technologies to manage their knowledge assets according to Ali et al (n.d). Engr. Philip Emeagwali (1999) put it that the internet is the greatest of all networks, the network of several networks (usually local networks) in its pool. The internet was not invented in 1993 by a single individual as it widely believed. The internet is product of a succession of invention that occurred in the 1970's and 1980's. The dream behind the web is of a common information space in which we communicate by sharing information, its universality is essential. The fact that a hypertext link can point to anything, be it personal, local or global, be it draft or highly polished. there was second part of the dream too dependent on the web being, so generally used i.e. because a realistic mirror (a fact of the primary embodiment) of the works in which we work, play card and socialize that was once the state of our interactions was online, we could then use computer to help us analyse it, make sense of what we are doing, here we individually fit in how we will better work together. With the dramatic flood of rich material of all kinds onto them in which 1990's, the first part of the dream is large realized, although still very few people in practice have access to initiative hypertext creation tools. The second part has yet to happen, but there are signs and plans which makes us confident, sort, pay for, own information is during the design of languages for the web design for processing by machines rather than people. The web of human readable document is being merged with a web of machine understandable data. The potential of the mixture of human and machines working together and communication through the web could immense. According to Owo Abidemmi E. (2002): "there has been lot of improvement on the web programming concepts. We had the top-down and bottom-up, the procedural and structures. The object oriented and event driven programming methods of software application and information generator to meet the user's requirements. Ndukwe and Chike (2005), says that internet is a system of computer network, connected to one another from different parts of the world, forming a very large network, hence it is a global connection of networks both big and small. Meanwhile, internet has many subsets which of them is World wide Web (www), which is the most powerful and growing internet service, it uses hypertext links called hyperlinks to locate and retrieve pages from www servers. Okafor and Dimoji (2009) says "internet" which is an example of national information highway, is a huge computer network available to nearly everyone who has a computer and all the accessories to connect it. Internet is a network connecting thousands of other network and computers. You can use internet to transfer electronic mail, public discussion, copying files (upload and download) and even run programs on a computer in a remote place. "Another feature of www is the hypertext to describe text that is not constrained to be sequential. Hypertext as described by Nelson links documents to form a web of relationship that draws on the possibilities for extending and augmenting the meaning of a "flat" piece of text with links to other text. Hypertext, therefore is more than just footnotes that serve as commentary of furthermore, information in a text,

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instead, hypertext extends the structure of ideas by making "chuncks" of ideas available for inclusion in many parts of multiple texts, Nelson also coined the term hypermedia which is hypertext not constrained to be text. Ndukwe and Chike (2006) says that a web is a series of interconnected servers that support specially formatted documents. It contains a server which is a program that respond to request from other programs and delivers the requested documents. A major initial motivation for both the early network ARPNET and internet was resource connecting the two together was far more economical than duplicating these very expensive computers.

However, while file and database transfer and remote login (Telnet) were very important applications, electronic mail has probably had the most significant impact of the innovations. From that era, e-mail provided a new model of how people could communicate with each other and change the nature of collaboration. First in the building of the internet www itself and later for much of society. A key concept of the internet is that, it was not designed for just one application and as a general infrastructure on which new application could be conceived, as illustrated later by the emergence of the world wide web. It is a web evolution will bring us new applications- internet telephone and slightly future out, internet television, it is evolving to permit more sophisticated forms of pricing and cost recovery, a perhaps, painful requirement in this commercial world, it is changing to accommodate yet another generation of underlying network technologies with different characteristics and requirements from broadband residential access to satellites.

The internet of these applications is generally to promote a product or service or actually sell a product or service over the network, be it local or global (Bob, BI.M 1996). Thus, attracting and keeping a target audience is an important aspect of web programming.

There are two basic approaches to KM for which IT can provide support: codification and personalization denotes Hansen et al. 1999 (Bernard C, Y, T n.d). With the codification approach, more explicit and structured knowledge is codified and stored in knowledge bases. The main role of IT here is to help people share knowledge through common storage to achieve economic reuse of knowledge. An example of such IT tools is electronic knowledge repositories. With the personalization approach, more tacit and unstructured knowledge is shared largely through direct personal communication. The main role of IT here is to help people locate each other and communicate to achieve complex knowledge transfer.

Knowledge management can be built and integrated into the structures and processes of Colleges, as organisations, with Knowledge Management methods and tools. The list of Knowledge Management Methods and Tools was compiled and agreed by the Asian Productivity Organization (APO) KM methods and tools expert. It represents those methods and tools implemented by the most successful organizations around the world, within their KM implementation initiatives. According to APO (2010), there are nine ICT KM methods and tools as following as in **Table 1** below (next page)

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**Table 2**: **Nine ICT Knowledge Management Methods and Tools**

| | **Methods and Tools** | Description | Importance |
|---|---|---|---|
| 1. | Document libraries (e.g. Google Docs) | Document repository with good categorization and/or taxonomy, filing and, arranged for searching. | Finding the right information at the right time. |
| 2. | Knowledge bases ( e.g. wikis) | They are collaborative and participative databases that are structured to answer, for a given knowledge topic, the 'what, why, where, when, who, and how' (the six components of knowledge). | Knowledge bases enable many more people in the organization to create, Collaborate, develop, and access new knowledge, more often as participants, to rapidly feedback and even create and edit new knowledge, where appropriate. |
| 3. | Blogs | A Blog is a very simple 'journal style' website that contains a list of entries, usually in reverse chronological order. The entries are typically short articles or stories, often relating to current events. | The process of writing blog entries is one of the easiest ways of engaging in knowledge capture and sharing. The simplicity of the blog sites, coupled with the ability for readers to be automatically notified of new entries, makes the process of knowledge distribution very simple. |
| 4. | Social networks (e. g. Facebook, Twitter, WhatsApp etc.) | A social network is a group of people who share a common area of interest. Social network services are online systems that support social networking. The core services they offer usually include;<br><br>1. Finding people who have similar interests or needs;<br>2. Aggregating people into groups, or subgroups, and being able to communicate with those groups; and<br>3. Sharing content, such as documents links to relevant websites, or even streaming video. | A well-targeted network can provide its members with access to highly relevant knowledge, connections, and advice |
| 5. | Advance search tools | They are advanced search tools that are offered by most of the search engines. E.g. a search for How to * a car will produce information on how to drive, wash, sell, make, or donate a car. | Getting the right information can be a hit-and-miss affair. Knowing how to use the search tools to narrow down the options is an important skill for any knowledge worker. |
| 6. | Voice-over-Internet Protocol ( VOIP) | The capability of sending both audio and video signals between computers, using nothing more than a broadband connection and some low-cost equipment, such as a webcam and a headset. | The addition of screen sharing allows people to deliver presentations and e-learning at very low cost and with surprisingly high levels of interaction. |
| 7. | Knowledge clusters | The term 'Knowledge Cluster' is a term given to a group that—as a result of coming together in this new way—create, innovate, and disseminate new knowledge. Different individuals, teams, and organizations come together, virtually, on the Internet, to better | This enables small and medium-sized enterprises, for example, to gain access to, and participate in, new knowledge networks with new knowledge resources. They can communicate, collaborate, learn, share, and apply their knowledge |

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| | | | |
|---|---|---|---|
| | | communicate, collaborate, learn, and share knowledge through the cluster. | much faster and at a much higher quality than ever before. |
| 8. | Expertise locator | Expertise Locator (Expert Locator, Who's Who) is an information technology tool to enable effective and efficient use and/or share of existing knowledge by connecting people who need particular knowledge and people who own the knowledge. | It supports finding the right people with the right knowledge at the right time among many SMEs to effectively and efficiently do business together. |
| 9. | Collaborative virtu al workspaces | It the combination of document sharing, collaborative editing, and audio/video conferencing. Although suppliers offer software packages that contain all these elements, many users assemble their own collection of tools that meet their specific needs. | It enables people to work together, irrespective of where they are physically located. 1. It allows organizations to access the best skills anywhere in the world; 2. It can dramatically reduce travel costs; and 3. It allows people to work when and where is most effective for them, as well as giving them access to information when they need it. |

*3) The Colleges need to capture the key knowledge of their workforce and learn from its lessons is evident. The Administration staff and own workforce call for the College to infuse knowledge management practices into the daily work of the academic operation Area (Kurniawan, Y 2014). Knowledge-related assets include knowledge in the form of printed documents such as patents and manuals, knowledge stored in electronic repositories such as a "best-practices" database, employees' knowledge about the best way to do their jobs, knowledge that is held by teams who have been working on focused problems and knowledge that is embedded in the organization's products, processes and relationships (King W.R. 2009).*

*2.2.3 Technology based KM in education*

Studies of existing knowledge management systems developed for education indicate the 'learning object repository' is the prevalent model (Comensoli, J, 2008). Petrides & Nodine (Chu, K.W et al, 2011) state that technologies, are the most effective platform for target groups to access and exchange useful information across departments. Therefore, KM can be used to better manage knowledge for Colleges not only by building up people networks but by also enriching knowledge in College communities by processes and technologies to improve College's competitive performance.

Information that resides with lecturers and in the boundaries between levels of educational, clusters of Colleges, and the College system as a whole is lost due to the lack of an integrated knowledge management system. Knowledge management, a systematic way to identify, create, represent and distribute knowledge, offers a mechanism for the transfer of learning and development of collaborative practices. The development of such a system offers the advantages of time saving, quality improvement, practical knowledge made applicable, replication, consistency, ability to update knowledge, learning tools, cost savings and productivity, according to Abdullah et al, (Comensoli, J, 2008).

The main reasons for KM in Management Education is ( Kurniawan, Y 2014): (1) All Management institutes possess a state of the art modern information infrastructure; (2) Sharing knowledge among staff, students, course, programs, placements and administration is usually done in all management institutes; (3) The academic environment in general is considered trustful in the sense that no one is hesitating nor being afraid of

publishing knowledge; (4) Each institute wants its internal documentation management and the level of information and knowledge sharing to improve; (5)There is an increased demand for new strategies that help management institutions meet external and internal demands.

In Zambia, The e-College Training Program is a developed special course aimed at training College administrators in the ministry of education, to equip them with an in-depth understanding of how ICTs can be effectively used as tool to facilitate daily administration of College activities and knowledge management in Colleges, to close knowledge gaps (E-College system n.d).

### *2.2.4 Lecturers and Technology based KM*

Knowledge management is essentially a human related process that uses technology as an enabler. In education, limitations include perceived irrelevance to the circumstances of the knowledge user; teaching materials considered personal to the lecturer, private and requiring protection; resistance to the re-use of someone else's work and resistance to having own work re-used. Parr and Ward (Comensoli, J 2008) in a study of a lecturer on-line community determined that similar concerns prevented lecturer participation in an on-line site established for their use. Research has demonstrated that people will not use knowledge management systems simply because they exist (Hall, 2006; Parr & Ward, 2006; Santo, 2005) according to Comensoli, J (2008). The issues of ease of use, the self-interest of network members and willingness to share knowledge are likely to be major issues to resolve in the design of an educational knowledge management system.

Lecturers' knowledge about their students and teaching and learning methods is mostly tacit, process-oriented and driven by experience, embedded in their understanding of the normative pedagogical framework of 'good teaching and learning'. Lecturers are often 'isolated workers' who are rarely sharing their expertise because it is either not transferable or the team structures are not supportive. In this context, the idea of taking off this expertise (process knowledge) and making it generally available sounds compelling. Knowledge management is essentially a human related process that uses technology as an enabler.

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The problem of eliciting process knowledge has already been the crucial point in all technology driven knowledge management approaches. Extracting, modeling or retrieving "tacit knowledge" as named by the Hungarian philosopher Polanyi (Andreas, B 2004), is hardly possible. The endeavor in Colleges is to make the expertise of lecturers (and students) explicit, finding ways to formalize, to store it and to make it accessible to others.

### *4) 2.2.5 Benefits of Technology based KM in Colleges*

KM can also be used as an alternative strategy by Colleges to improve competitive performance. Petrides and Nodine (Chu, K.W et al, 2011) consider broadly that knowledge management in education can be thought of as a framework or an

approach that enables people within an organization to develop a set of practices to collect information and knowledge mentioned above and share what they know, leading to action that improves services and outcomes. KM initiatives help to establish robust processes that enable people to get the information they need when they need it, as well as to share it with others who may benefit from it. KM can help to promote those processes that lead to a more informed decision making to agreed that, when properly used, information and communication technology hold great promise to improve teaching and learning in addition to shaping workforce opportunities (Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. 2005).

KM literature contains several studies, which reviewed the KM discipline and tried to identify the main research topics by the analysis of a publication sample. A variety of established research methods such as meta analyses, content or documentary analysis, and literature reviews has been applied. The focus of the studies ranges from the analysis of popular research methodologies, most cited authors and hot research topics in KM to the analysis of a mixture of these issues

Knowledge management can benefit educational institutions in at least five areas: research, curriculum development, student and alumni services, administration, strategic planning, and traditional classroom enhancement, according to Kurniawan, Y (2014). According to Olivera (Pérez S, n.d), those technology systems serve a variety of functions such as storing large amounts of information, making information accessible to individuals, providing means of communication, generating records of interactions and transactions, and automating processes.

Information Technologies should be understood less in its capacity to store explicit information and more in its potential to aid collaboration and co-operation between people. Dougherty (Egbu C, Botterill K, 2002), argues that Information Technologies should be seen as a tool to assist the process of Knowledge Management in organisations. However, most experts in the field of education agreed that, when properly used, information and communication technology hold great promise to improve teaching and learning in addition to shaping workforce opportunities (Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. S. 2005). KM literature contains several studies, which reviewed the KM discipline and tried to identify the main research topics by the analysis of a publication sample. A variety of established research methods such as meta analyses, content or documentary analysis, and literature reviews has been applied. The focus of the studies ranges from the analysis of popular research methodologies, most cited authors and hot research topics in KM to the analysis of a mixture of these issues.

For instance, Wallace, Van Fleet and Downs (2011) analysed a corpus of 630 KM articles to find out, which research methods the KM community is mostly dealing with. Nearly three quarters of the articles (455 studies) applied traditional research methods (e.g. questionnaires, surveys, case studies), whereas the remaining 175 articles did not use any of the established research methods. Case studies seem to be most popular with a percentage of 26.8%, followed by questionnaires (16.9 %) and literature reviews (15.4 %). CA was placed on the seventh rank with an overall frequency percentage of 2.6 %. These findings differ marginally from the findings of Dwivedi et al. (2011), who conducted a meta-analysis on a summary of 1043 articles published in 358 journals. The authors grouped their results according to categories from which the multi-method approaches were ranked. On the first place (26.8 %) followed by the category of literature analysis / frameworks and conceptual methods (23.6 %) and case studies (14.8%). CA can be found on a similar position as in the former study with a percentage of 2%. Dwivedi et al. (2011)

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### *M.* *2.4 Summary*

Knowledge Management (KM) has already reached the level of a scientific discipline and attracts increasing interest in research and practice. Consequently, the number of KM publications is growing exponentially. The wide spectrum of publications comprises a variety of topics ranging from terminological, conceptual, and technological approaches to managerial implementation approaches. Several attempts have been made to achieve a common ground of the KM discipline.

# CHAPTER THREE

# METHODOLOGY

## 3.1 INTRODUCTION

The project development methodology includes Rapid application Development (RAD) method with the mixed mode approach involving USE CASE models, system development tools and programming languages.

## 3.2 BASELINE STUDY

RAD model has been used to develop 'The Project' knowledge base because of the following RAD method characteristics;

1. RAD Involves minimal planning in favour of rapid application prototyping allowing the system to be developed faster.
2. RAD is best System prototyping and implementation on an online website creation tool (Word Press) written in PHP for easier change requirements for the iterative development advantage of RAD development.
3. The system development with RAD is interleaved with the software itself.
4. RAD has best Structure and prototyping techniques that are especially used to define users' requirements and to design final system.
5. RAD promotes active user involvement in the system development.

RAD method has four (4) phases (wikibooks.org 2019):

1. Requirements planning,
2. User design,
3. Construction and
4. Cut over (implementation) phases

### *N. 3.2.1 Data Collection*

There are numbers of approach to data collection depending on the nature of the research being conducted. In this project, the methods adopted include the following: Interview, World Wide Web, references to published and unpublished collection. The data collected for 33 this research can be broadly classified into two types, namely: the primary and secondary data, (Innovative Architects, 2019).

**Primary data sources**

Primary data can be defined as data collected directly from respondent relevant to the subject under investigation. The primary data used in this case is interview method according to, (Dime,2019) says that primary source data collection is source from first-hand information can be obtained. The tools for gathering the primary source of data collection include; interview, observation and questionnaires.

**Secondary sources**

These are source of data collection in which an already made data are been obtained i.e. that information that is already in printed form. Sources of secondary data include, textbooks, magazines, journals etc. in the case of this project, most of the data are published, documents, and references, (Dime,2019).

**The Interview Approach**

I employed a combination of both oral interview, questionnaires and observation method consulting of staff, students, lecturers and downloading of information via website to investigate the system. The oral interview and distribution of questionnaires was given to lecturers and students and other facts. The ideas for this research works was conducted in the exams and record of this school which involved about 5 (five) persons old and new student were also interviewed, (Dime,2019).

### *O. 3.2.2 Research Approach*

The data collected was presented and analyzed using the table and simple percentages. A thorough and initial analysis was done at the end of each presentation. The forming of percentage is % = N/f x 100/1 Where N = the number of occurrence f = the total number of occurrences.

### *P. 3.2.3 System Design*

The system design in this project involves system software design, user interface design and the database design. Systems design is the process of defining the interfaces, and data for a system to satisfy specified requirements. Systems design could be the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. In this section, as a system designer, I made use of tools like algorithms and flowcharts to develop the design of the program.

**Algorithm:** An algorithm explained below represents the logic of the processes to be performed by user. The logic process is represented in a sequence of instructions which are designed in such a way that if they are executed in the specified sequence, the desired goal of specific requirements is achieved in an algorithm, Each and every instruction is precise and clear and executed in a finite time.

**Flowchart:** Another tool the developer used was a flow chart. Here the flow chart represents a pictorial representation of the algorithm. It represents the steps involved in the procedure and shows the logical sequence of processing using boxes of different shapes. The instruction to be executed is mentioned in the boxes. These boxes are connected by solid lines with arrows, which indicate the flow of operation. The first step in the design of a program is the algorithm. The algorithm is then represented in the form of a flowchart and the flowchart is then expressed in the computer language to prepare the computer program.

**Modular Programming:** Using this method the entire program is divided into smaller manageable modules so that the smaller modules can be designed, coded and debugged separately.
**Top-Down Design:** Here the overall problem is first defined in terms of general subtask. These subtasks are divided into further subtasks. The system design pertains to the layout of the system and it consists of the input and output layout which takes in both forms and reports but I this report only a few will be illustrated.
**Input design** The system takes in several inputs including information about the candidates to write the recruitment examination, the question to be asked in the examination and the answers
**Login form** with the registered credentials and then move to the interface where available exams are shown.

**Admin** panel is specially designed to facilitate all tasks that need to be done or attempted by the student user. Microsoft word was used to design the templates about the system. The modelling languages were

used to express the information and knowledge in a structure of system that is defined by a consistent set of rules and definitions.

These phases have been accounted for in the development of System.

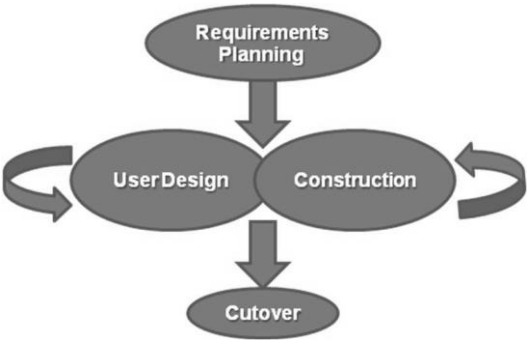


**Figure 1 RAD Model**

The KM system is designed to function as simple as possible to be used by four main actors according to the use case models in this paper.

### 1. The Administrator and the Expert instructor Actors

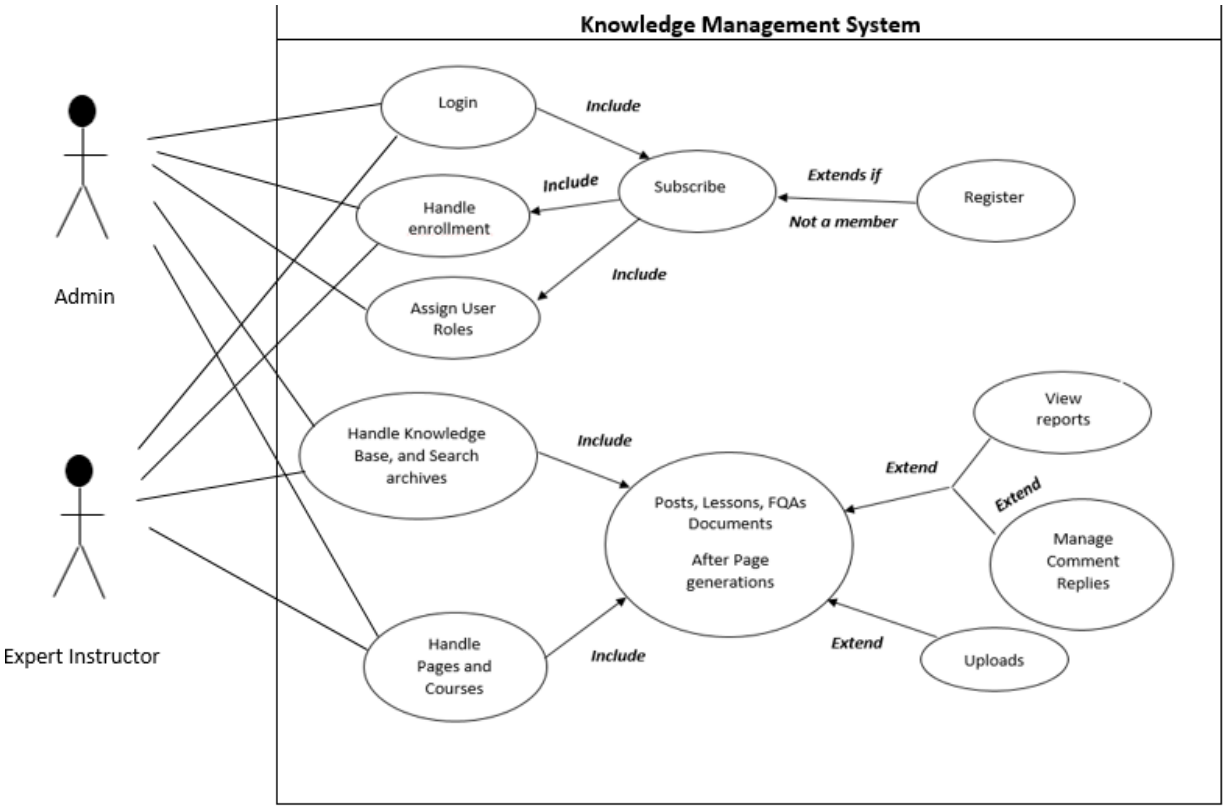


**Figure 2 Admin/Expert Use Case Model**

The administrator is privileged to assign roles to expert instructors to edit and provide content for the knowledge base system among others functions. The expert instructor's function mainly includes editing and providing content for the system.

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### 2. Student Actor

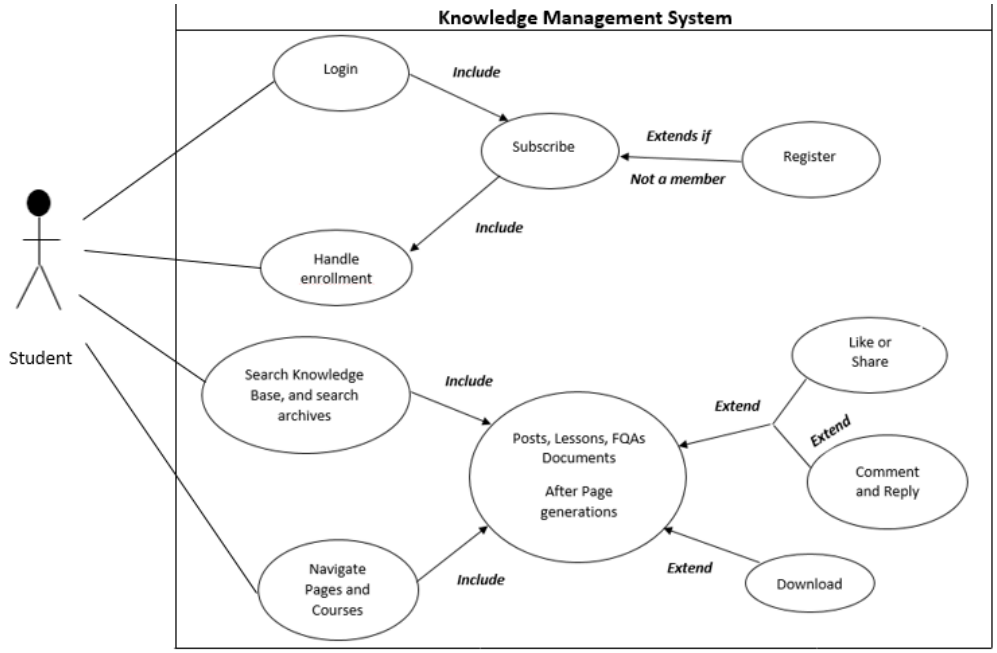


**Figure 3 Student Use Case Model**

Student actor functions is the mainly role of developing the whole knowledge base system.

### 3. Lecturer Actor

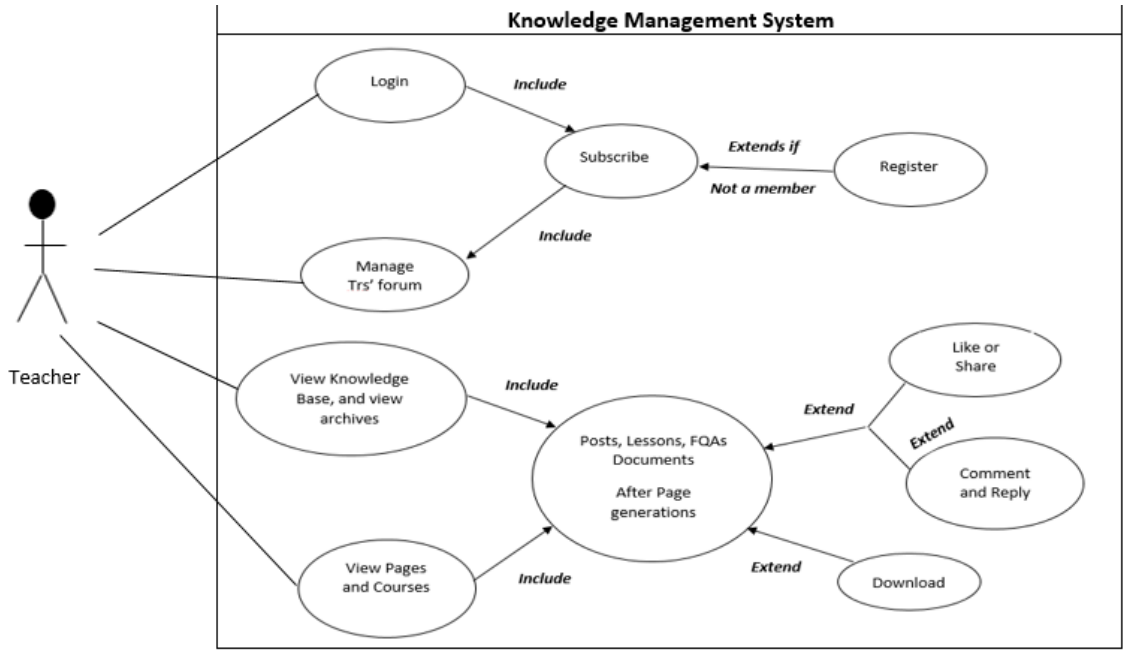


**Figure 4 Lecturer Use Case Model**

Lecturer actor's function in this case, is to view the system knowledge base pages and only to manage the forum page.

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The system design in this project involves system software design, user interface design and the database design. Systems design is the process of defining the interfaces, and data for a system to satisfy specified requirements. Systems design could be the application of systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and systems engineering. In this section, as a system designer, I made use of tools like algorithms and flowcharts to develop the design of the program.

Algorithm: An algorithm explained below represents the logic of the processes to be performed by user. The logic process is represented in a sequence of instructions which are designed in such a way that if they are executed in the specified sequence, the desired goal of specific requirements is achieved in an algorithm, Each and every instruction is precise and clear and executed in a finite time.

Flowchart: Another tool the developer used was a flow chart. Here the flow chart represents a pictorial representation of the algorithm. It represents the steps involved in the procedure and shows the logical sequence of processing using boxes of different shapes. The instruction to be executed is mentioned in the boxes. These boxes are connected by solid lines with arrows, which indicate the flow of operation. The first step in the design of a program is the algorithm. The algorithm is then represented in the form of a flowchart and the flowchart is then expressed in the computer language to actually prepare the computer program.

Modular Programming: Using this method the entire program is divided into smaller manageable modules so that the smaller modules can be designed, coded and debugged separately.

Top-Down Design: Here the overall problem is first defined in terms of general subtask. These subtasks are divided into further subtasks. The system design pertains to the layout of the system and it consists of the input and output layout which takes in both forms and reports but I this report only a few will be illustrated.

Input design The system takes in several inputs including information about the candidates to write the recruitment examination, the question to be asked in the examination and the answers Login form with the registered credentials and then move to the interface where available exams are shown.

Admin panel is specially designed to facilitate all tasks that need to be done or attempted by the student user. Microsoft word was used to design the templates about the system.

The modelling languages were used to express the information and knowledge in a structure of system that is defined by a consistent set of rules and definitions.

#### Q. *3.3.1 System software design*

The open source online web creating tool, Word Press, was used in the free host server to create the online Knowledge Base. The light weight word press theme was selected and configured to make the prototype. The software pieces to create the System were identified according to user requirements for each system module were installed and integrated to make a single system. The selected plugins for each system module are; Knowledge Base system, FAQs system, Learning Management system and Forum system to be integrated on Word Press content management system.

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### R. 3.3.2 User interface design

The proposed system will the five system modules and three pages as shown in *Figure 5.0*

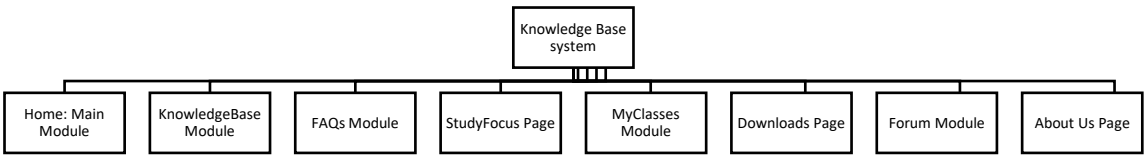


**Figure 5 Collegepages Knowledge Base System Architecture**

### S. 3.3.3 System Modules and Pages

- **Home:**
  This is a blog for latest articles, search panel for archives, with static side panels for which appears on the system pages. It is the main content management system module.
- **About us:**
  This is a page that gives information about the system, its objectives and its mission as well as the managing team
- **Common Q and A:**
  This is the page that contains FAQs system plug in to display Answers once a user clicks on the Common question.
- **My Class:**
  This page contains LMS displaying courses, subjects and lessons once the user enrolls by login in the selected course.
- **Study Focus:**
  This page contains general information on study resources on various subjects and links to others teaching and learning resources.
- **Knowledge Base:**
  This database for the main knowledge base system plugin for KM into which the users can search knowledge contained into various categories of subjects
- **Downloads:**
  This is the page for downloads on selected educational resources such as syllabi, books, pamphlets, workbooks, reading materials, brochures, etc.
- **Lecturers':**
  This is the password protected page for lecturers' only. It a forum plugin that enables the lecturers exchange knowledge on pedagogical matters based on what they seem to include or remove from the Knowledge base and common Q and A, system modules.

### T. 3.3.4 Graphical user interface Design


**Figure 6 System Graphical User Interface in Tablet Mode**

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*U.* ***3.3.5 Database design***

The database design of the system is been taken care of through the online website creating tool automatically generate the databases in the host server. Once the content categories are selected in each plugin configuration settings, database tables are generated, hence no need to reinvent the wheel.

## 3.4 TOOLS AND LANGUAGES

'The Project' prototype design is developed with Word press, an online open source website creating tool written in PHP. This tool is one of the powerful blogging and website content management system (CMS) (2015 iThemes). Word Press is customizable has more plugin pieces of software to add on. Word Press provides for coding in HTML mode according to developer's choice. MySQL and PHP database programming are mainly in customizable mode by word press and plugins developers' restrictions. Hypertext Mark-up Language Hypertext mark-up language (HTML) is the core language for building web sites of this kind. It is universally used in web development and responsible for marking up and structuring the content of all pages. Matters such as colour, positioning of elements, and decoration are of the Cascading Style Sheet (CSS), which is briefly discussed in technologies. The latest revision used is HTML5. It has different features that allow developers to build web pages that are smarter and faster than the old version of HTML. For better understanding HTML5 elements that are used for making good structure of a web page, (Wayner,2019). HTML document the first line contains a small piece of code, which indicates to the browser that it is compliant with HTML5. The browser examines the DOCTYPE to load the right grammar to speed up parsing and rendering the content of the page correctly. The most interesting new HTML5 elements are semantic attributes, graphics and multimedia. HTML5 is also using a new application programming interface such as geo location, drag and drop, local storage and application cache. It is important to know at least the basics of HTML5, because knowledge of HTML5 was required to be able to build the search engine application, (Wayner,2019).

**CSS** Cascading Style Sheet Cascading Style Sheet is a language used to describe the style of an HTML document and how the content should be displayed. It is utilized to control the visual aspect of a 4-web page, including colors, background colors, element positioning, fonts, images, and other design aspects, (Wayner,2019). The HTML tag is used for selecting the element that the style must be applied to; the code inside curly braces describes the style. The application uses different CSS files for different purposes. Based on the designs and decisions made for choosing colors, background colors, and the layout, creating these files was a must to meet the project goals and fulfil its requirements, (Wayner,2019).

**JavaScript** JavaScript is the web programming language used to build interactive and dynamic websites. Developers can use it to change stylish appearance when it is loaded into the user's browser. It is useful for listening to events and mouse clicks JavaScript uses different key terms such as variables, objects, functions, and events. Understanding the basics of JavaScript was a must to meet the needs of the customer in the project documented in this thesis. There are two options for adding JavaScript, it can either be inside an HTML file, or linked to external JavaScript files. The example in listing 3 shows an inline script. an inline script was added to an HTML file. This script uses an event called on load. When a page finishes loading, it will display the text "Welcome. 5 Since the application is based on the JQuery library, it will be a good chance for new trainees to practice and get to know how to use it in different situations. More about JQuery and its features will be presented in section

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### 3.5 SYSTEM ENVIRONMENT

The system running environment on any standard browser and on any device with internet access. Word press provides an HTTPS secured environment. The system is installed online, on the free sever space on 000hostserver.com. 'The Project' can be accessed on this server and on any device that runs a standard browser on this URL;

### 3.6 SYSTEM USE CASE MODEL

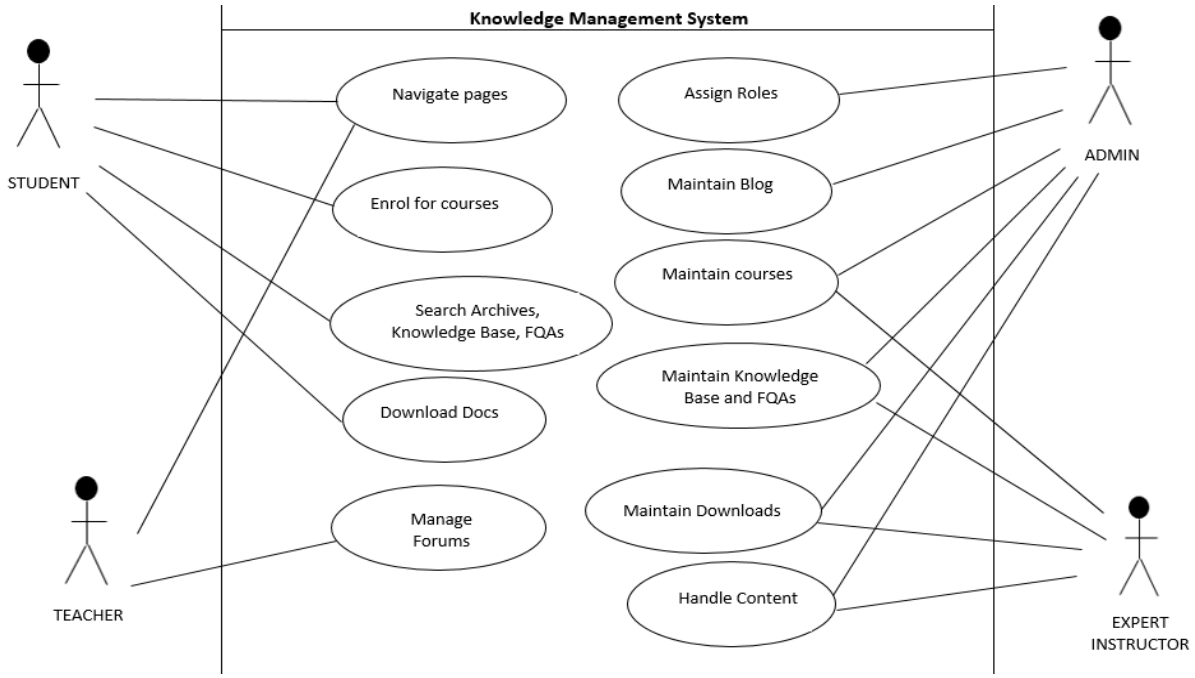


**Figure 7 System Use Case Model**

**Roles of Actors on the Use Case Model**

Each of the four actors have specific roles to play on the system, that is;

1. **The Admin**
   This actor has 6 roles but mainly maintain the system and to manage other 3 actors.
2. **Expert tutor**
   This actor has four roles that include mainly to maintain content on the system and to manage student actors.
3. **Lecturer**
   This actor has two roles on the system that includes to monitor the system by navigating to assess content and to make contributions and suggestions on the lecturers' forum of the system.
4. **Student**
   This actor has four roles on the system. It is the main actor to access knowledge from the system modules.

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# CHAPTER FOUR

# RESULTS

## 4.0 INTRODUCTION

The solution to the development of the Knowledge Base system is as the result of the advantages of online systems and the motivation to design a system to contribute to the education sector in Knowlwdge managenet systems.

### V. *4.1 Baseline Study Results*

A webbased system has been developed instead and not a desktop system due to the following reasons;

1. College learners can access the Knowledge base anytime, anywhere and on any device that has a standard internet browser.
2. A web-based system is easier to update and upgrade by the system administrator and other privileged content contributors at anytime and anywhere.
3. The open source online website creating tool is very easy to use, expandable with system plugins and installed for free on the free host server.

### W. *4.3 System Implementation Results*

"The Project" is designed to be simple to use without prior training and with a simple user interface. The system administrator and Expert instructors must have passwords for system control panel. Lecturers and Students should log in and out of the system. The system should run on any device that has a standard web browser. The system should be secured on the network with a HTTPS URL. The system is intended to be a light weight website with less demand on data bundles for young learners to afford as most ISPs in Zambia do not provide zero data rates for educational systems.

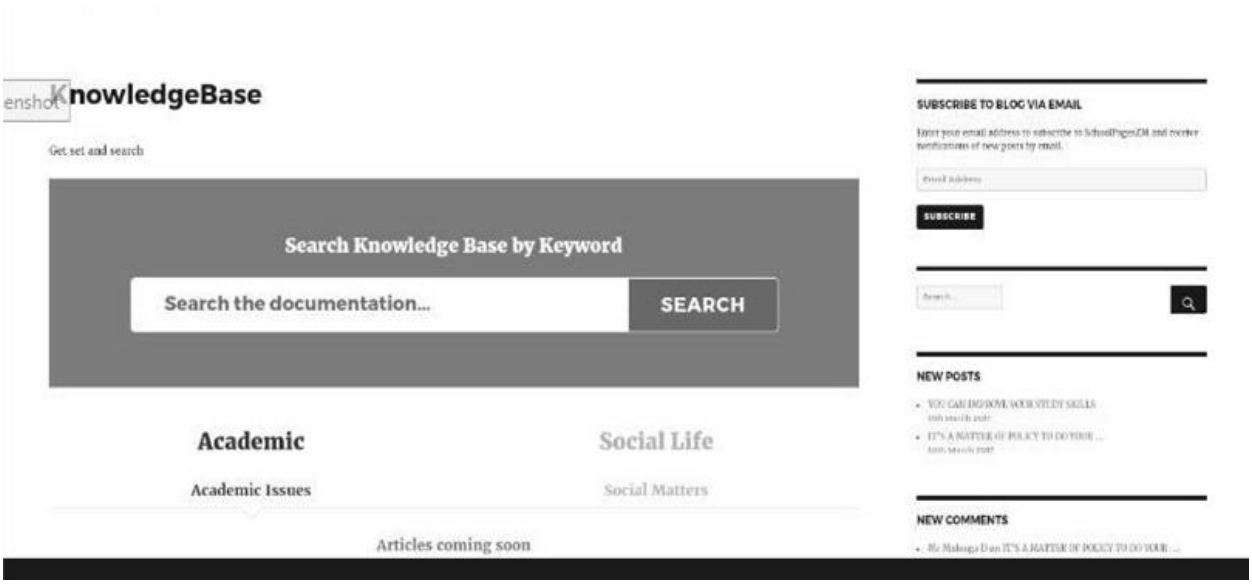


**Figure 8 Knowledge Base User interface**

System functions have been arranged according to the users' needs assessments in the requirements planning phase of RAD as follows;

1. **System Core functions**
   The system core functions are: Knowledge base system, FAQs system, Learning Management System as ***MyClass*** in this project.
2. **Useful functions**
   The useful functions of the system are: Forum system for lecturers, and downloads page.
3. **Nice to have functions**
   These nice to have functions to spice up the system and to keep the user's interested in it as compared to social media, *LIKE*, *COMMENT* and *SHARE* functions. The developer feels that these nice to have functions, can promote user collaborative values, making the system easy, engaging and exiting.
   Presentation of the proposed system for a trial run and demonstration among system users was performed. This was necessary to draw comments from the users, suggestions where appropriate, and recommendations that may help improve the system. The systems were finalized taking into consideration the feedback of the users. The project was presented to the users on this uniform resource locator is:

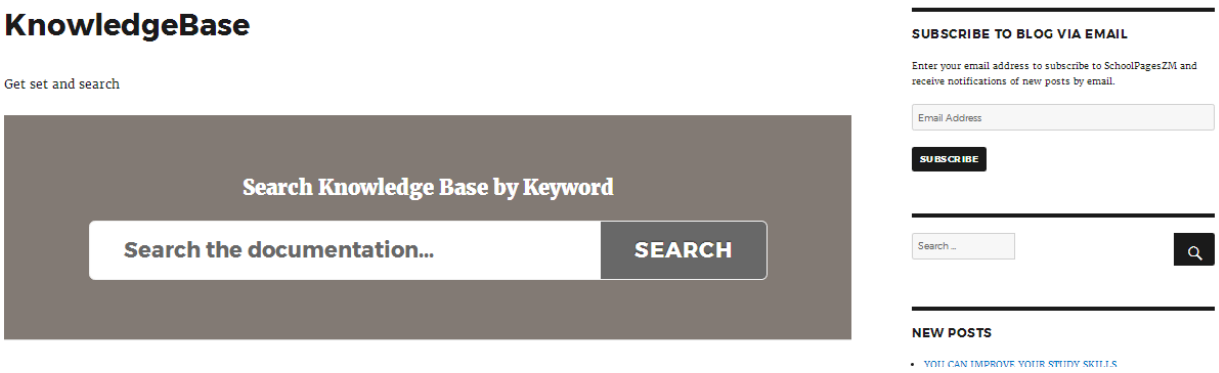


**Figure 9 System Graphical User Interface in Desk top Mode**

The presentation of the proposed system was commendable. The graphical user interface is both appealing and friendly to the users and developer. There is a unity and consistency in the grouping of functions of modules and pages in the system.

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# CHAPTER 5

# DISCUSSION AND CONCLUSION

## 5.1 INTRODUCTION

Knowledge management is any system that helps people in an organization share, access, and update business knowledge and information. An effective knowledge management system reduces these costs of inefficiency by making the college's knowledge more available, accessible, and accurate. It's particularly important for businesses today because teams are much more distributed. When you have multiple branches or hire remote employees, the need for a system of distributing knowledge increases exponentially. This system will benefit the learner's parents and guardians of students as an additional source of free educational content in line with the government relevant policies.

## 5.2 DISCUSSION

The system theme is very light, meaning less demand on data bundles. There is no question as to the acceptability of the proposed system, for one reason that students and lecturers have long depended on the manual system of accessing vital knowledge in Colleges' registry. This system offers superior alternative that makes for ease, efficiency as well accuracy as it is easy, exiting and engaging to utilize.

Effective knowledge management of this system can reduce operational costs and improves productivity in the following six key benefits:
Spend less time recreating existing knowledge. When information is easy to access and accurate, it reduces the need for coworkers to interrupt each other with emails, chats, and support tickets.
Employees and especially support teams spend less time answering repetitive questions, freeing them up to focus on more important and more profitable work.
Get the information you need sooner (and with fewer headaches). If you've ever sent an email asking for information only to have that email forwarded multiple times to different people who might know the answer, you know how unproductive it is when finding information feels like playing a game of whack-a-mole.

Make fewer mistakes. The old age "history repeats itself" is as true in business as it is in all other aspects of life. When employees aren't sharing information, they're doomed to repeat the same mistakes others have already made. But this is avoidable when the lessons-learned from mistakes and failures are easily accessible to everyone.
Make informed decisions. When employees share their experiences, lessons-learned, and research on a searchable knowledge system, others can access and review that information in order to consider multiple pieces of data and differing viewpoints before making decisions.
Standardize processes. If you've ever played the telephone game, you know exactly how distorted information gets when communicated by word-of-mouth and in silos. With documented and shared processes, it's easy to make sure that everyone is on the same page and following approved procedures.
Provide better service to employees and customers. Effective knowledge management allows support teams to resolve employee and customer requests quickly and correctly. Employees can stay happy and productive, and customers place more trust in the company, which makes them more likely to purchase.

## 5.3 BASELINE STUDY

System testing was done based on the following system quality assurance factors;

**Efficiency of the Website**

1. The pages can be easily loaded or accessed
2. The navigation icons/page controls are easy to follow
3. The site allows interactive sharing of Knowledge

**Quality of Content**

1. The information available on the pages are updated
2. The information is pertinent to the need of users
3. The information is presented with enough depth
4. The information is adequate and readily verifiable
5. There are no typographical and grammatical errors found in the website

**Layouts and Graphics Appropriateness**

1. The site was designed with good graphic design principles
2. The graphics or pictures are clearly labelled and identified
3. The font type and font sizes of the texts are appropriate and readable

**Security and Maintenance**

1. The pages are secured from tampering/ hacking by users or visitors.
2. The pages allow periodic updates

The ultimate test of system relevance is its usefulness and functionality, its ability to deliver according to the defined expectations from the systems requirements.

The proposed system has shown advantage in the aspects of usefulness and functionality for the following reasons:

1. The design has been made according to the identified needs of the user.
2. The standard features of plugins are used with friendly features that endow the system with an ease of handling and user-friendliness.
3. The system boasts of error-free that can be relief to effectively handle and process data and perform search tasks.

## 5.4 SUMMARY

The implementation of CKMS will benefit colleges in the following ways; improved organizational agility; better and faster decision making; quicker problem-solving; increased rate of innovation; supported employee growth and development; sharing of specialist expertise; better communication; improved business processes. The implementation of CKMS will benefit colleges in the following ways; improved organizational agility; better and faster decision making; quicker problem-solving; increased rate of innovation; supported employee growth and development; sharing of specialist expertise; better communication; improved business processes

## 5.5 CONCLUSION

Colleges in the nation requires a Knowledge Management System (KMS) though most systems in the education sector have Education Information Management System (EIMS) and College Information Management Systems (CIMS). The role of Knowledge Management is to assure competitiveness, through capturing, storing, sharing, and utilizing knowledge in an innovative way in order to improve performance of an organisations. Colleges as organisations, requires a knowledge base to manage knowledge electronically.

## 5.6 FUTURE WORKS

In future, more features need to be added to this system such as wikis, quiz, Moodle, etc., among other plugins to completely engage the learners on educational matters using ICTs in Colleges, according to the national curriculum and educational standards.

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## APPENDICES

### *Appendix A: Source Code*

```
<%@ Page Language="C#" MasterPageFile="UserMasterPage.master" AutoEventWireup="true"
   CodeFile="frmUserRegistration.aspx.cs" Inherits="Admin_frmUserRegistration" %>

<%@ Register Assembly="GMDatePicker" Namespace="GrayMatterSoft" TagPrefix="cc1" %>
<asp:Content ID="Content1" ContentPlaceHolderID="ContentPlaceHolder1" runat="Server">
   <table border="0" cellpadding="0" cellspacing="0" width="100%">
      <tr>
         <td style="width: 100%" valign="top" align="left">
            <table width="100%" border="0" cellpadding="3" cellspacing="0">
               <tr>
                  <td colspan="3" class="LoginTitle" style="height: 18px">
                     User Registration</td>
               </tr>
               <tr>
                  <td align="center" colspan="3">
                     <asp:Label ID="lblerror" runat="server" CssClass="redtext" Font-Bold="True" Font-Names="Verdana"
                        Font-Size="9pt" ForeColor="Red" ></asp:Label></td>
               </tr>
               <tr>
                  <td align="left" colspan="3">
                     <span style="color: red">*-Mandatory Fields</span></td>
               </tr>
               <tr>
                  <td>
                     User Name<span class="redtext">*</span></td>
                  <td>
                     :</td>
                  <td>
                     <asp:TextBox ID="txtUserName" runat="server" Width="160px"></asp:TextBox>
                     <asp:RequiredFieldValidator ID="RequiredFieldValidator2" runat="server" ControlToValidate="txtUserName"
                        ErrorMessage="*"></asp:RequiredFieldValidator>
                     <asp:LinkButton ID="lnkbtnCheckAvailability" runat="server" CssClass="linkbtn" CausesValidation="False"
                        OnClick="lnkbtnCheckAvailability_Click">Check Availability</asp:LinkButton></td>
               </tr>
               <tr>
                  <td>
                  </td>
                  <td>
                  </td>
                  <td align="left">
                     <asp:Label ID="lblExistsMemberId" runat="server" Text="" Visible="false"></asp:Label></td>
               </tr>
               <tr>
                  <td>
                     Password<span class="redtext">*</span></td>
                  <td>
                     :</td>
                  <td align="left">
```

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***Appendix B: Data base Access Code***

```
if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_UserDetails_tbl_City]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_UserDetails] DROP CONSTRAINT FK_tbl_UserDetails_tbl_City
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_City_tbl_Country]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_City] DROP CONSTRAINT FK_tbl_City_tbl_Country
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_State_tbl_Country]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_State] DROP CONSTRAINT FK_tbl_State_tbl_Country
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_UserDetails_tbl_Country]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_UserDetails] DROP CONSTRAINT FK_tbl_UserDetails_tbl_Country
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_DocumentDetails_tbl_DocumentCategory1]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_DocumentDetails] DROP CONSTRAINT FK_tbl_DocumentDetails_tbl_DocumentCategory1
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_City_tbl_State]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_City] DROP CONSTRAINT FK_tbl_City_tbl_State
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_UserDetails_tbl_State]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_UserDetails] DROP CONSTRAINT FK_tbl_UserDetails_tbl_State
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_City_tbl_Status]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_City] DROP CONSTRAINT FK_tbl_City_tbl_Status
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_Country_tbl_Status]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_Country] DROP CONSTRAINT FK_tbl_Country_tbl_Status
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_DocumentDetails_tbl_Status]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_DocumentDetails] DROP CONSTRAINT FK_tbl_DocumentDetails_tbl_Status
GO

if exists (select * from dbo.sysobjects where id = object_id(N'[dbo].[FK_tbl_State_tbl_Status]') and OBJECTPROPERTY(id, N'IsForeignKey') = 1)
ALTER TABLE [dbo].[tbl_State] DROP CONSTRAINT FK_tbl_State_tbl_Status
GO
```